

REMARKS

Claims 1-18 are pending and await further action on the merits.

Claims 7 and 16 have been amended to clarify that the electrode layers in the laminate which is part of the positive or negative electrode each contain a catalyst in the same way as claims 1 and 10.

No new matter has been added by way of the above-amendment.

Issues under 35 U.S.C. 103

Claims 1-18 are rejected under 35 USC 103(a) as being unpatentable over Motomura et al (JP 2002-015743) in view of Mizuno (US 2001/0049047). Applicants respectfully traverse the rejection.

In the July 25, 2006 Amendment, Applicants argued that Motomura et al. neither teach nor suggest providing the adhesive layer between at least two electrode layers containing a catalyst that are laminated, as recited in present claims 1, 7, 10 and 16.

With respect to this requirement that there be at least two electrode layers containing a catalyst, the Examiner has interpreted the claims so that one of the at least two electrode layers can contain a catalyst and the other of the at least two electrode layers do not require the catalyst and can be a gas diffusion layer. See the last full paragraph on page 4 of the outstanding Office Action. Accordingly, Applicants have amended claims 1 and 10 (in the December 12, 2006 Amendment) and claims 7 and 16 (in this paper) to recite that at least one selected from the positive electrode and the negative electrode comprises a laminate of at least two electrode layers **each** containing a catalyst.

Based on this amendment to claims 1, 7, 10 and 16, there are clear patentable distinctions between the present invention and the teachings of Motomura et al and Mizuno.

Applicants now reiterate the comments for patentability which were made in the December 12, 2006 Amendment beginning at the top of page 9.

Furthermore, the mere fact it is possible for isolated disclosures to be combined does not render the result of that combination obvious absent a logical reason of record, which justifies the combination. *In re Regel et al.* (CCPA 1975) 526 F2d 1399, 188 USPQ 136. Applicants respectfully submit that the combination of Motomura et al. and Mizuno is improper.

Motomura et al describe a solid polymer fuel cell including a plurality of catalyst layers between a cathode gas diffusion layer and a polymer electrolyte membrane, characterized in that a water content W1 of an ion exchange resin contained in the innermost catalyst layer that is in contact with the polymer electrolyte membrane is set to be equal to or greater than 10%, a water content W2 of an ion exchange resin contained in the outermost catalyst layer that is in contact with the gas diffusion layer is set to be equal to or greater than 5%, and the water content W1 is set to be at least 5% higher than the water content W2.

On the contrary, Mizuno describes a method of manufacturing a fuel cell by fixing an electrolyte film composed of a solid polymer electrolyte film to a frame, characterized in that the solid polymer electrolyte film is caused to have a water content of not greater than 4, which is expressed as a molar fraction of H₂O. In Mizuno, the solid polymer electrolyte film is integrated with the anode and the cathode (both made of carbon cloth) as follows- A paste containing carbon particles with platinum or a platinum alloy carried thereon as the catalyst is applied on the surface of the solid polymer electrolyte film, interposed between the anode and the cathode, and then they are hot pressed (see paragraphs [0042], [0047] and [0048] in Mizuno).

Here, as in "the electrolyte film having the water content λ of not greater than 4 (the weight ratio of not greater than 8%) ensures the sufficient adhesive strength of the electrolyte film to the carbon plate" (see paragraph [0065] in Mizuno), Mizuno attempts to enhance the adhesiveness of the solid polymer electrolyte film to the electrode by setting the water content of the ion exchange resin constituting the solid polymer electrolyte film to be not greater than 8%. Therefore, Mizuno is not directed to a technology that can be combined with Motomura et al, which requires the water content W1 of the ion exchange resin contained in the innermost catalyst layer to be equal to or greater than 10%. Also, Mizuno discloses bonding the solid polymer electrolyte film to each electrode with a solution of proton-conducting solid polymer

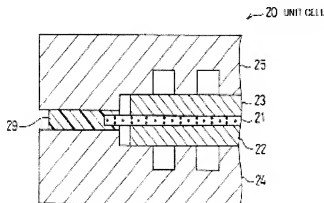
(see paragraph [0048] in Mizuno). However, the above-noted solid polymer electrolyte film has a lowered water content realized by storage in the atmosphere having the relative humidity of not greater than 50% (see paragraph [0065] in Mizuno), whereas the solution of solid polymer serving as an adhesive is not subjected to such a treatment. Consequently, if the anode and the cathode (both are carbon cloth) and the electrolyte film to which the catalyst such as platinum has been applied are bonded to each other with the above-noted solution of solid polymer, an ion exchange resin (solid polymer solution) having a high water content is present on the side of the gas diffusion layer (carbon cloths of the anode and the cathode), which is contrary to Motomura et al. Therefore, this also makes it clear that Motomura et al and Mizuno should not be combined. Thus, the present invention should not be rejected by the combination of Motomura et al and Mizuno.

The Examiner mentions that it would have been obvious to one of ordinary skill in the art to bond in between the plurality of catalyst layers of Motomura et al with a solution of proton-conducting solid polymer of Mizuno. However, paragraph [0058] of Motomura et al reads "it is preferable that the water content W of the ion exchange resins contained respectively in the plurality of catalyst layers decreases from the innermost catalyst layer toward the outermost catalyst layer. By providing a negative inclination to the water content W of the ion exchange resins in the respective catalyst layers from the innermost catalyst layer toward the outermost catalyst layer in this way, the innermost catalyst layer and the outermost catalyst layer can effectively achieve a function of an efficient electrode reaction and a function of an efficient water drainage that are intended respectively." Here, if bonding is carried out in between the plurality of catalyst layers with the solution of proton-conducting solid polymer of Mizuno as stated by the Examiner, it becomes difficult to achieve the structure in which the water content W decreases from the innermost catalyst layer toward the outermost catalyst layer. Thus, there would be a technological disincentive to bonding in between the plurality of catalyst layers of Motomura et al with the solution of proton-conducting solid polymer of Mizuno.

Accordingly, there are clear patentable distinctions between the present invention and the teachings of Motomura et al and Mizuno.

With respect to instant claims 7 and 16, Applicants have argued in the July 25, 2006 Amendment, that Motomura et al. neither teach nor suggest making the polymer material having the proton conducting property present more in the interface part of each of the catalyst layers that are laminated than in the inner part thereof. However, the Examiner relies on Figure 2 of Mizuno for teaching this feature. Specifically, the Examiner directs Applicants' attention to Figure 2 of Mizuno which is as follows:

Fig. 2



On this matter, the Examiner states:

It is noted that Fig. 2 of the Mizuno reference shows a polymer adhesive material "29" that is present more in an interface part of each of the electrode layers than in the inner part. It is implicit from the teaching of Mizuno that the electrolyte film "21" has catalyst layers on each side. Therefore, the polymer adhesive would be present more on the interface part of each catalyst layer than the inner part. In addition, the adhesive would also be more on the interface part of the electrode than the inner part in order to maximize the active area of the electrode."

During a telephone conversation with the Examiner on October 12, 2006, the Examiner confirmed that he believes that element 29 of Fig. 2 meets the feature of claims 7 and 16. During the telephone conversation, the Examiner indicated that for this interpretation to be proper, element 29 must be in contact with elements 22 and 23. However, the Examiner will note the

empty rectangles represent flow paths for the gaseous fuel and oxidizing gas. Accordingly, element 29 could not be in an interface part with electrodes 22 and 23, as is required by the present claims. It is more appropriate to find that the adhesive layer 29 is present in an interface part of a separator 24, 25 and an electrolyte film 21.

Furthermore, instant claims 5 and 14 are further removed from the teachings of Mizuno and Motomura et al. Mizuno teaches that the adhesive "contains 2% resin beads of 50 μ m in diameter for regulating the thickness of the adhesive layer" (see paragraph [0057] in Mizuno), and thus it is clear that the thickness of the adhesive layer 29 is regulated to be at least 50 μ m. This is contradictory to claim 5 or claim 14 of the present invention.


In view of the above-amendment and comments, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq. Reg. No. 43,575 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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